Comparative Study in Chemical Character and Fatty acid Compositions of Masked Civet's Fat and Nutria's Oil

Hong Meiling(洪美玲) Yang Chunhua (杨春花)
Wang Lijun (王力军) Zou Xinghuai (邹兴淮)
College of Wildlife Resource, Northeast Forestry University, Harbin !50040, P. R. China

Abstract The fat production rate in adult healthy masked civet(*Paguma lavata*) and nutria (*Myocaster coypus*) oil were measured. The values of iodine, saponification and acid pH, composition of fatty acids of grease were analyzed both chemically and by apparatus. The results showed that acid pH, iodine value, saponification value, and unsaturation point are 1.887 and 0.784, 53.90 and 48.32, 98.80 and 100.23, and 60.05% and 58.85% are respectively for masked civet's fat and nutria's oil. Both of masked civet's fat and nutria's oil contain a little of Eicosatetraenoic acid (C-20:4), which is of great significance in nutrition and metabolism for human body. The analysis results indicate that masked civet's oil is similar to nutria's oil in iodine value , saponification value and unsaturation point. Both masked civet's fat and nutria's oil are steady and have highly nutrition. They can be widely exploited and utilized in health protection and cosmetics made industry.
Key words: Masked civet, fat, Nutria, oil, Chemical character, Unsaturation point

Introduction

Masked civet(*Paguma lavata)*, Mammalia, Viverridae, is mainly distributed in Shanxi, Sichuan, Tibet, Yunnan provinces, etc.. Its meat is delicious and has special flavor. It is easy to be raised artificially, with high productivity.

Nutria(*Myocaster coypus)*, Rodentia, Capromyidae, originated in Argentina, Chili, etc. in south America. It is a kind of herbivores fur-bearer. Its artificial raising has such merits as durable fur and low cost and high productivity.

Masked civet and nutria have high economic value and wide prospect of utilization. At present, we only make use of their raw products such as meat and fur or skin. Their products have not been developed and tapped deeply. In this paper, the exploitation and utilization of these two kinds of animals were discussed and analyzed for raising them artificially.

Materials and Methods

In this experiment, we chose 4 healthy adult Masked civets raised in Hunan Province and 3 healthy male nutrias raised in Beijing. Their weights were recorded immediately after they were killed and skinned. Excise the grease on viscera and subcutaneous tissue, weigh these fats, and then calculate the rate of fat production (Table 1).

The crude oil, in transparent and light yellow, was obtained by poaching small pieces of grease and discarding the residue. At room temperature, masked civet's oil become a white paste, while nutria's oil is liquid with perfumed scent. The oil from the two kinds of animals was analyzed in Analysis Center Laboratory of the Northeast Forestry University. Their acid pH, saponification value and iodine value were chemically measured. The compositions of fatty acid were analyzed by use of Q-Mass 910 Gas Chromatography-mass Spectrums made by P-E Company in America. The quantitative analysis was made by use of Diaojing GC-9A gas chromatogram made by Japan .

Result and Discussion

The rate of fat production

From the Table 1, we can see that the fat production rate of masked civet is almost two times as much as that of nutria, which indicates that the relative content of body fat of masked civet is higher than that of nutria.

Table 1. Comparison of rate of fat production between masked civet and nutria

Species	Body weight (g)	Fat weight (g)	Fat production fat (%)
Nutria	8666.67±1504.62	806.67±273.54	9.05±1.58
Masked civet	1337.50±221.85	248.75±109.91	17.80±5.21

Rather for masked civet or for nutria, the content of body fat grows with body weight increases. In other words, the weights of body fat were positively relative to body weights(see Fig. 1).

Comparison of chemical nature

The chemical indexes such as acid pH, saponification value and iodine value were determined in this experiment (Table 2).

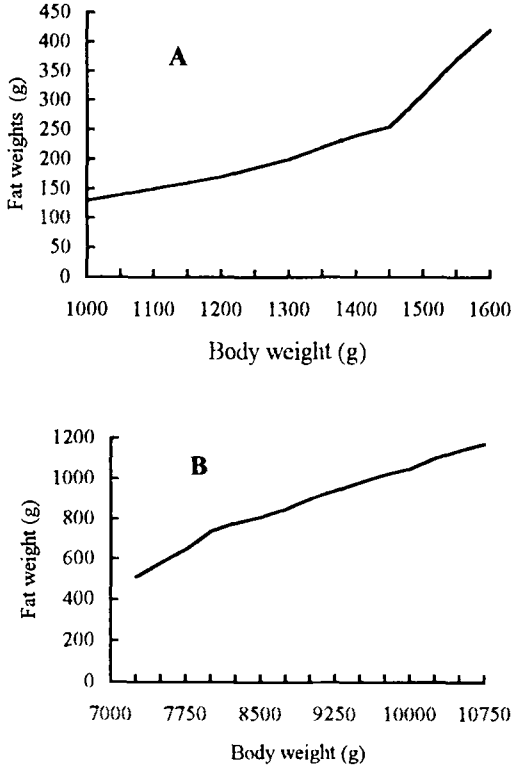

Fig. 1. The relation between the weight of body fat and body weight

A-- Masked civet; B-- Nutria

Table 2. Chemical character of masked civet's fat and nutria's oil

species	Acid pH	Saponification value	iodine value
Nutria's oil	0.78	100.23	48.32
Masked civet's fat	1.89	98.80	53.90

Acid pH Acid pH is an indicator of rancidity, signified by the amount of KOH (mg) which is used to neutralize the fat of 1g in weight. In fat (oil), the higher acid pH is, the more free fatty acids are, or the more severe rancidity is. In general, there is no free fatty acids in the fat of healthy living animals, but in dead or killed animal's body, the fat become rancid due to the result of lipase enzymolysis.

The stored fat, especially fat on viscera, may be decomposed by light, air, microbe and enzyme. The fat may be rancid when it becomes dark and bitter or gives off pungent and offensive odor. If more free fatty acids were accumulated in human body, it would be easier to induce cancer and reduce immune-function. So we should not eat severe rancid fats. We should refine fats in time after the animals were killed in order to decrease the content of free fatty acids. The acid pH of masked civet's fat shown in Table 2 is obviously higher than that of nutria's oil. This may be resulted from fat oxidation and decomposition in the course of collection, refinery and long-distance travel. The acid pH of the two kinds of anomals in this experiment are more than 2 times as high as the regulated standard of edible fat.

Saponification value It refers to the milligrams of KOH needed by one gram fat when saponificated completely). Animal fat is decomposed into glycerin and fatty acid when hydrolyzed by acid or lipase, and decomposed into glycerin and fatty acid salt (i.e. soap) when hydrolyzed by alkali. Macromolecule fatty acid with a long carbon chain has a high saponification value. The Mw of the fatty acid of a kind of fat and the nonsaponification product can be estimated by the saponification value of this fat. The higher the saponification value is, the shorter the carbon chain is , i.e. the higher the content of low-order fatty acid is. From Table 2, the saponification values of masked civet's fat and nutria's oil are high (about 100), which indicates that for the two kinds of animals, fatty acids with short carbon chain is profuse and the Mw of this kind of fatty acid is low. The fatty acid with short carbon and low Mw is easy to be absorbed and used by human body. The fat which contain abundant fatty acids with low Mw has great value in food industry and cosmetics industry.

Iodine value Iodine value refers to grams of ICl or IBr consumed by 100 g fat when addition reaction of the fat with ICl or IBr takes place in given time. It indicates the kinds and the amount of fatty acids of which a kind of fat consists. The number of unsaturated double bonds contained in an animal fat can be estimated according to the iodine value. Higher iodine value means that greater amount of ICl (or IBr) are consumed and unsaturation point of the fat is higher. This kind of fatty acid (unsaturated fatty acid) is liable to be coagulated at normal temperature, and has a high mobility. According to this experiment, the iodine value of refined oil of masked civet(53.90) is higher than that of nutria(48.32). These two kinds of oils are non-drying oil for their iodine values are lower than 100.

The fatty acid composition

The fatty acids contained in the fat of masked civet and nutria were shown in Table 3.

Summary

The acid pH of masked civet's fat comes up to the standard of edible oil even though it is higher than

that of the nutrias oil. Masked civet's fat can be used as edible oil, or raw materials in food industry.

The saponification values of both masked civets and nutrias are comparatively high, which indicates low-order fatty acids contained in the fat of the two animals are abundant. Since low-order fatty is easy to be soaked and absorbed by human body's skin, the two kinds of fat (oil) can all be applied to cosmetics-making industry.

Table 3. Composition and content of fatty acids in the fat of masked civet and nutria.

Composition		Content (%)	
		masked civet,	nutrias
Laurie acid	c-12:0	0.08	0.23
Myristic acid	c-14:0	2.04	3.29
Fifteen carbon-alkyl acid	c-15:0	0.02	0.36
Palmitoleic acid	c-16:1	3.97	6.08
Palmitic acid	c-16:0	29.99	23.96
Seventeen carbon alkyl acid	c-17:0	0.04	1.11
Linolic acid	c-18:2	---	25.67
Oleic acid	c-18:1	55.06	25.85
Stearic acid	c-18:0	8.32	11.79
Mixed acid	c-20:4	0.63	0.28
Mixed acid	c:20:1	0.39	0.97
Mixed acid	c:20:0	0.03	0.40
Unsaturation point		60.05	58.85

The content of oleic acid in fat of masked civet is over 55%, which is one times more that of nutrias' oil. The contents of palmitic acid for both the animals are beyond 20%. Seventeen carbon alkyl acid is present in the fat of these two kinds of animals, revealing that fatty acids with odd-number carbon-atoms are also contained in natural animal fat. Thus breaks away from the traditional concept that all kinds of natural fat are composed of fatty acids with even-number carbon-atoms. The contents of unsaturated fatty acids in masked civet's fat and nutria's oil are similar to each other, while unsaturation point is comparatively high for both the animals. The fat of the kinds of animals contains much human body-necessitated fatty acids that take part in main metabolic course. Both masked civet and nutria have a kind of rare fatty acid, arachidonic acid. The content of arachidonic acid in masked civet is higher than that in nutria. In this aspect masked civet's fat is superior to nutria's oil. However, the fat in masked civet is scant of another human body-necessitated fatty acid, inoleum acid, whose content in nutria amounts to more than 25%. In this sense, the fat of masked civet is inferior to that of nutria.

To sum up, masked civet's fat and nutria's oil are two kinds of good animal fats and they can be exploited and used both in medicine and hygiene and in cosmetics industry.

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